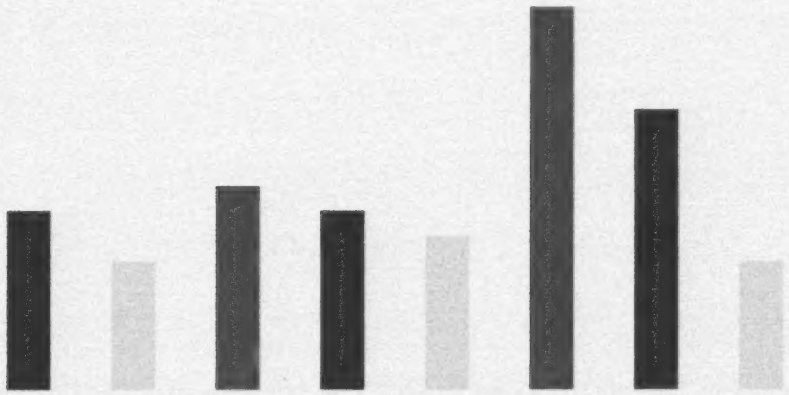
Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

Statistical Summary Pipeline Occurrences 2011



Canada

Foreword

This document provides users of Canadian pipeline safety data with an annual summary of selected statistics on pipeline occurrences. It covers federally regulated pipelines only. Non-federally regulated data reported to the TSB are not included in this report. Information in this summary is also posted on the Transportation Safety Board of Canada (TSB) Internet site at www.bst-tsb.gc.ca.

Users of these statistics are advised that, in a live database, the occurrence data are constantly being updated. Consequently, the statistics can change slightly over time. Further, as many occurrences are not formally investigated, information recorded for some occurrences will not have been verified. Therefore, caution should be used when using these statistics. The 2011 statistics presented in this document reflect the TSB database as of 15 February 2012.

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The TSB is an independent agency operating under its own Act of Parliament. Its sole aim is the advancement of transportation safety.

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PIPELINE OCCURRENCES IN 2011

In 2011, in the federally-regulated pipeline system[1], 34 companies transported 191 million cubic metres of oil (1.2 billion barrels) along 17,508 kilometers of active oil mainline and gathering lines. Sixty companies transported 151 billion cubic metres of natural gas (5.3 trillion cubic feet) along 52,024 kilometers of active natural gas mainline transmission and distribution lines.

ACCIDENTS

Five pipeline accidents were reported to the TSB in 2011, down from the 2010 total of 11, and below the 2006–2010 average of 9. Accidents involve pipelines (i.e., transmission lines) or other facilities such as compressor stations, pump stations, meter stations, and gas processing plants. Of the five accidents reported in 2011, two involved pipelines, two occurred at meter stations, and one occurred at a terminal. The last fatal accident on a federally-regulated pipeline system occurred in 1988. One accident resulting in a serious injury occurred in 2006 and another serious injury occurred in 2009.

According to information provided by the National Energy Board, estimated pipeline activity increased 4% from 2010. An indicator of pipeline transportation safety in Canada is the pipeline accident rate. The 2011 rate was 0.4 pipeline accidents per exajoule[2], down from 2010 (0.9) and down from the 2006–2010 average of 0.7 (Figure 1).

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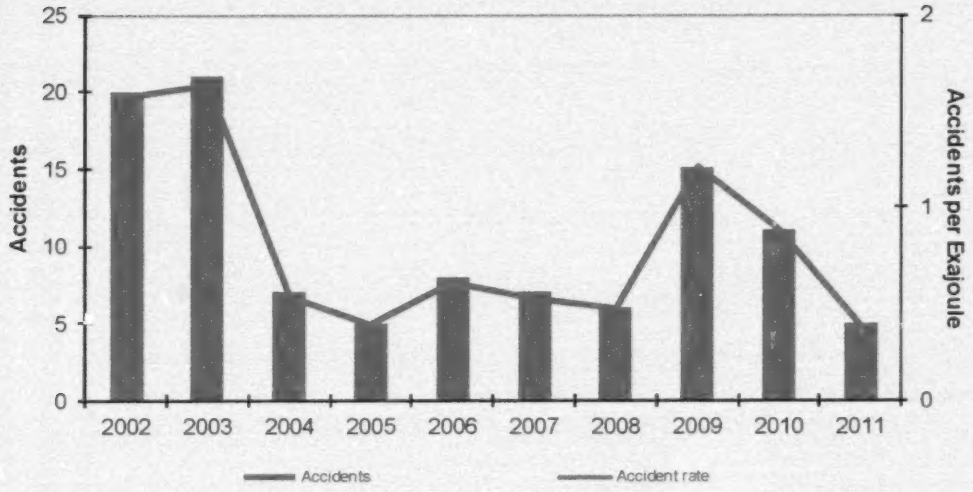
1 Source: National Energy Board (estimated).

2 One exajoule = 10^{18} joules (A joule is a unit of work or energy equal to the work done by a force of one newton acting through a distance of one metre.)

Figure 1: Accidents[3] and accident rate[4] (accidents per exajoule[5])



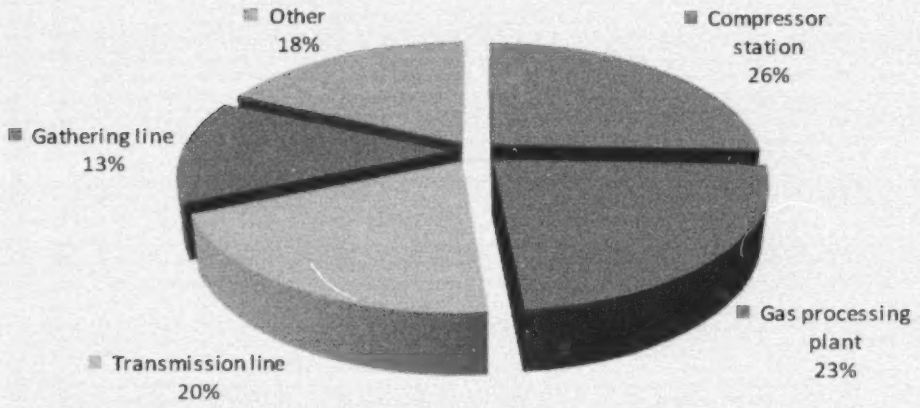
Nearly 50% of pipeline accidents over the 10 year period (2002–2011) occurred at compressor stations and gas processing plants and 20% occurred on transmission lines (Figure 2).

3. Reportable pipeline occurrences after 2003 reflect the impact of clarifications to the pipeline industry of the TSB's accident and incident reporting requirements, and of internal adjustments to the data in TSB's Pipeline Occurrence Database System.

4 In 2009, there was a 38% increase in federally regulated pipeline and associated facilities when an additional 23 705 kilometres of pipeline were transferred from provincial jurisdiction.

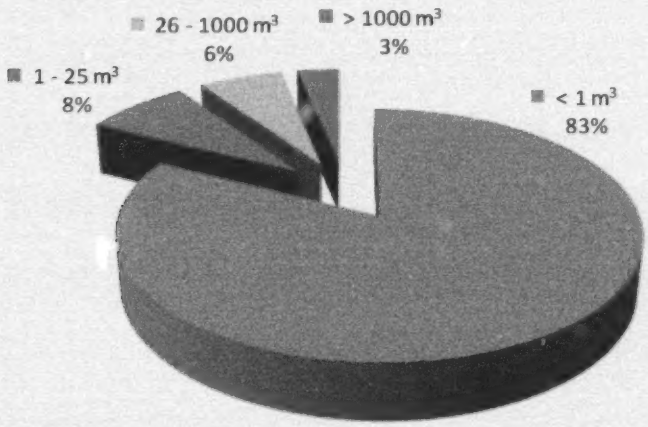
5 Source: National Energy Board (estimated).

Figure 2. Accidents by facility type, 2002–2011



Over the 2002-2011 period, 63 of the 105 accidents had a release of product. Twenty-one of these involved release of natural gas, all less than one cubic metre[6]. Seventeen involved release of crude oil, with one over 1000 cubic metres, three between 26 and 1000 cubic metres, four between 1 and 25 cubic metres, and nine less than 1 cubic metre.

Figure 3. Quantity released for accidents where product was released, 2002–2011

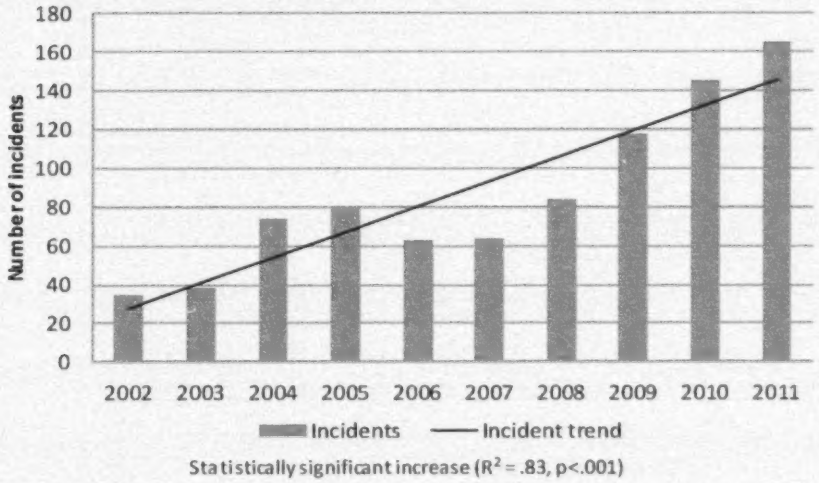


[6] One cubic metre equals 35.3 cubic feet.

INCIDENTS

In 2011, 165 pipeline incidents were reported to the TSB in accordance with the mandatory reporting requirements, up from 145 in 2010 and the five-year average of 95.

Figure 4. Pipeline incidents, 2002–2011

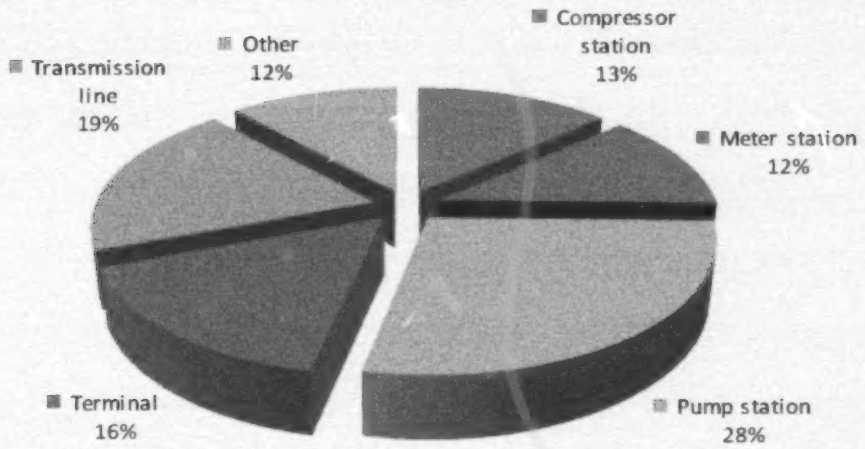


The significant increase in pipeline incidents since 2002 may in part be accounted for by the progressive implementation of improved inspection technologies across the pipeline industry, which has resulted in increased detection of small releases. Also, some of the uncontained releases were associated with the repair or start-up of new facilities. In addition, the conversion of a gas pipeline to an oil pipeline, and the associated change in the operating pressure, may have increased the number of oil leaks. Finally, some pipeline infrastructure was constructed in the 1950s, and may be becoming more susceptible to leaking with age.

Over the coming year the TSB will be examining these and other potential factors to determine their relative contribution to the overall incident increase.

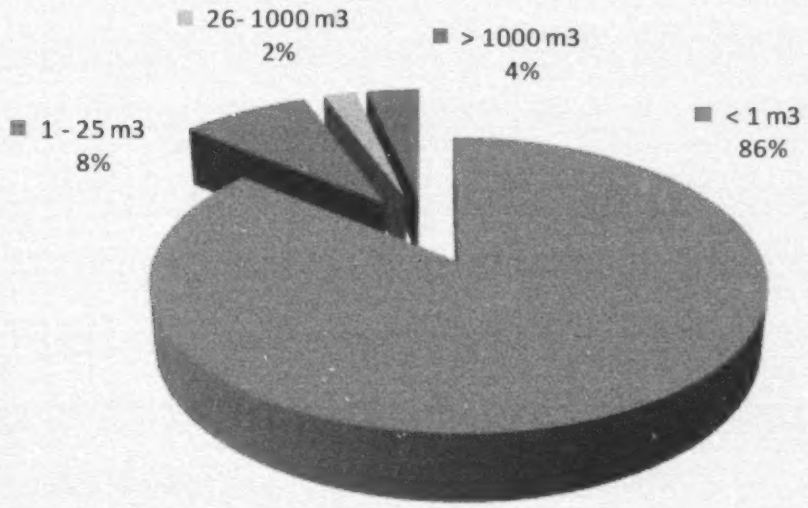
In 2011, 28% of pipeline incidents occurred at pump stations, followed by 19% on transmission lines (Figure 5).

Figure 5. Incidents by facility type, 2011



In 2011, 83% of incidents involved uncontained or uncontrolled release of less than 25 cubic metres of gas, oil or high-vapour-pressure product, and 12% involved no release of product. Three incidents involved release of between 26 and 1000 cubic metres of natural gas, and five involved release of more than 1000 cubic metres of natural gas (Figure 6).

Figure 6. Quantity released for incidents where product was released, 2011



APPENDIX A: PIPELINE OCCURRENCE TABLES

Table 1

Pipeline accidents and incidents by type
2002-2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Accidents	**20**	**21**	**7**	**5**	**8**	**7**	**6**	**15**	**11**	**5**
Total, line pipe	7	4	0	2	1	2	0	6	1	2
3rd party damage with release	0	1	0	1	1	1	0	0	0	0
Disturbance of supporting environment with release	0	0	0	0	0	0	0	0	0	0
Corrosion/Environmental cracking	0	0	0	0	0	0	0	0	0	1
Fire/Ignition/Explosion	3	1	0	1	0	0	0	3	0	1
Other damage with release	4	2	0	0	0	1	0	3	1	0
Total, other facilities (a)	13	17	7	3	7	5	6	9	10	3
3rd party damage	0	1	0	0	1	1	1	1	2	1
Corrosion/Environmental cracking	0	0	0	0	0	0	0	0	0	0
Fire/Ignition/Explosion	6	15	6	3	6	4	4	7	6	2
Other damage with release	7	1	1	0	0	0	1	1	2	0
Incidents	**35**	**38**	**74**	**79**	**63**	**64**	**84**	**118**	**145**	**165**
Total, line pipe	6	5	25	21	11	14	13	20	16	20
3rd party damage no release	2	2	1	0	3	2	3	5	2	1
Disturbance of supporting environment no release	1	0	0	3	0	1	0	1	0	2
Uncontained release	3	3	16	17	5	9	5	9	7	13
Other	0	0	8	1	3	2	5	5	7	4
Total, other facilities	29	33	49	58	52	50	71	98	129	145
3rd party damage no release	0	0	0	0	0	0	2	1	0	0
Uncontained release	25	29	45	54	51	45	61	86	119	122
Other	4	4	4	4	1	5	8	11	10	23

Data extracted February 15, 2012.
Federally regulated pipeline occurrences.
Reportable pipeline occurrences after 2003 reflect the impact of clarifications to the pipeline industry of the TSB's accident and incident reporting requirements, and of internal adjustments to the data in TSB's Pipeline Occurrence Database System.

Table 2

Pipeline activity and accident rate
2002-2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Accidents	**20**	**21**	**7**	**5**	**8**	**7**	**6**	**15**	**11**	**5**
Natural gas products (exajoules)	6.7	6.5	6.5	6.6	6.6	6.5	6.2	5.9	5.6	5.6
Petrolium products (exajoules)	6	6.4	6.5	6.3	6.5	6.6	6.3	6.5	6.8	7.3
Total (exajoules)	12.7	12.9	13	12.9	13.1	13.1	12.5	12.4	12.4	12.9
Number of accidents per exajoule	1.57	1.63	0.54	0.39	0.61	0.53	0.48	1.21	0.89	0.39

Data extracted February 15, 2012.
Federally regulated pipeline occurrences.
Source: National Energy Board (estimated).
One exajoule = 10^{18} joules (A joule is a unit of work or energy equal to the work done by a force of one newton acting through a distance of one metre.)

Table 3

Pipeline accidents and incidents by province
2002-2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Accidents	**20**	**21**	**7**	**5**	**8**	**7**	**6**	**15**	**11**	**5**
Nova Scotia	0	0	0	0	0	0	0	0	0	0
New Brunswick	0	0	0	0	0	0	0	0	0	0
Quebec	1	0	0	0	0	0	0	0	0	0
Ontario	2	1	0	1	1	2	1	5	2	2
Manitoba	1	0	0	0	1	1	1	0	1	0
Saskatchewan	4	2	0	1	0	1	0	2	1	1
Alberta	0	1	0	1	1	0	0	4	4	1
British Columbia	11	14	7	2	5	3	4	4	3	0
Northwest Territories	1	3	0	0	0	0	0	0	0	1
Incidents	**35**	**38**	**74**	**79**	**63**	**64**	**84**	**118**	**145**	**165**
Nova Scotia	1	2	0	1	1	2	1	0	1	5
New Brunswick	0	0	0	0	0	1	0	5	6	14
Quebec	1	2	3	4	1	3	2	4	2	2
Ontario	5	1	11	7	7	8	17	20	19	21
Manitoba	3	3	6	3	8	4	10	9	14	11
Saskatchewan	8	9	11	23	14	10	17	13	38	34
Alberta	4	3	9	21	11	11	16	36	51	55
British Columbia	13	18	32	16	20	23	19	26	13	11
Northwest Territories	0	0	2	4	1	2	2	5	1	12

Data extracted February 15, 2012.
Federally regulated pipeline occurrences.

Table 4

Pipeline accidents and incidents by facility type
2002-2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Accidents	**20**	**21**	**7**	**5**	**8**	**7**	**6**	**15**	**11**	**5**
Compressor station	5	5	1	0	4	2	2	3	5	0
Gathering line	4	6	1	0	0	1	0	1	1	0
Injection/Delivery facility	0	0	0	0	0	0	0	0	0	0
Meter station	0	0	0	0	1	0	1	0	1	2
Gas processing plant	5	7	5	1	1	0	2	3	0	0
Pump station	2	0	0	1	1	1	0	1	1	0
Storage facility	0	0	0	0	0	0	0	0	0	0
Terminal	0	1	0	1	0	0	1	0	2	1
Transmission line	4	1	0	2	1	3	0	7	1	2
Other	0	1	0	0	0	0	0	0	0	0
Incidents	**35**	**38**	**74**	**79**	**63**	**64**	**84**	**118**	**145**	**165**
Compressor station	7	7	5	10	8	8	20	32	26	22
Gathering line	3	3	7	8	5	5	5	9	7	7
Injection/Delivery facility	0	0	0	0	0	0	0	0	1	1
Meter station	0	0	0	0	1	5	2	13	21	20
Gas processing plant	6	12	20	7	9	4	8	8	5	3
Pump station	8	5	16	27	18	15	20	26	30	46
Storage facility	0	0	0	0	0	0	1	0	0	1
Terminal	5	5	7	11	9	11	10	13	21	26
Transmission line	4	3	15	13	12	14	17	16	32	32
Other	2	3	4	3	1	2	1	1	2	7

Data extracted February 15, 2012.
Federally regulated pipeline occurrences.

Table 5

Pipeline accidents and incidents with released by product type
2002-2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Accidents	**14**	**13**	**5**	**3**	**2**	**3**	**3**	**8**	**8**	**4**
Condensate	1	0	1	0	0	0	0	0	0	0
Liquified petroleum gas	0	0	0	0	0	0	1	0	0	0
Natural gas	4	4	0	1	1	1	0	5	3	2
Natural gas liquids	0	1	0	0	0	0	0	0	0	0
Petroleum crude oil	3	2	0	1	1	2	1	1	4	2
Refined products	1	0	0	0	0	0	0	1	0	0
Sour gas	2	0	1	0	0	0	0	1	0	0
Acid gas	0	0	0	0	0	0	0	0	0	0
Other	3	6	3	1	0	0	1	0	1	0
Incidents	**30**	**35**	**66**	**71**	**56**	**55**	**69**	**96**	**129**	**145**
Condensate	1	1	3	0	1	0	1	1	2	0
Liquified petroleum gas	0	0	0	1	1	0	1	1	2	1
Natural gas	5	10	14	16	14	19	26	37	55	59
Natural gas liquids	7	6	3	5	1	0	0	0	0	3
Petroleum crude oil	7	4	22	38	24	24	28	32	54	70
Refined products	0	1	0	1	2	1	1	2	4	0
Sour gas	3	2	9	5	3	5	1	7	2	2
Acid gas	0	0	2	2	0	1	1	0	0	1
Other	7	11	13	3	10	5	10	16	10	9

Data extracted February 15, 2012.
Federally regulated pipeline occurrences.

Table 6

Pipeline accidents and incidents by quantity released
2002-2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Accidents	**14**	**13**	**5**	**3**	**2**	**3**	**3**	**8**	**8**	**4**
Less than 1 cubic metre	10	13	5	2	1	1	2	7	8	3
1 to 25 cubic metres	2	0	0	1	1	0	1	0	0	0
26 to 1000 cubic metres	1	0	0	0	0	2	0	0	0	1
Greater than 1000 cubic metres	1	0	0	0	0	0	0	1	0	0
Incidents	**30**	**35**	**66**	**71**	**56**	**55**	**69**	**96**	**129**	**145**
Less than 1 cubic metre	21	27	48	56	47	44	53	87	119	125
1 to 25 cubic metres	6	4	8	9	4	7	13	5	5	12
26 to 1000 cubic metres	1	3	2	4	5	2	3	3	5	3
Greater than 1000 cubic metres	2	1	8	2	0	2	0	1	0	5

Data extracted February 15, 2012.
Federally regulated pipeline occurrences.

APPENDIX B: DEFINITIONS

The following definitions apply to pipeline occurrences that are required to be reported pursuant to the Canadian Transportation Accident Investigation and Safety Board Act and the associated regulations.

Pipeline
A pipeline that is used for the transportation of commodities and includes all branches, extensions, pumps, racks, compressors, loading facilities, storage facilities, reservoirs, tanks, preparation plants, separation plants, interstation systems of communication and property and works connected therewith.

Pipeline Occurrence
(*a*) Any accident or incident associated with the operation of a pipeline, and
(*b*) Any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident referred to in paragraph (*a*);

Reportable Commodity Pipeline Accident
An accident resulting directly from the operation of a commodity pipeline, where:
(*a*) a person sustains a serious injury or is killed as a result of being exposed to
(i) a fire, ignition or explosion, or
(ii) a commodity released from the commodity pipeline, or
(*b*) the commodity pipeline
(i) sustains damage affecting the safe operation of the commodity pipeline as a result of being contacted by another object or as a result of a disturbance of its supporting environment,
(ii) causes or sustains an explosion, or a fire or ignition that is not associated with normal operating circumstances, or
(iii) sustains damage resulting in the release of any commodity;

Reportable Commodity Pipeline Incident
An incident resulting directly from the operation of a commodity pipeline, where:
(*a*) an uncontained and uncontrolled release of a commodity occurs,
(*b*) the commodity pipeline is operated beyond design limits,
(*c*) the commodity pipeline causes an obstruction to a ship or to a surface vehicle owing to a disturbance of its supporting environment,
(*d*) any abnormality reduces the structural integrity of the commodity pipeline below design limits,
(*e*) any activity in the immediate vicinity of the commodity pipeline poses a threat to the structural integrity of the commodity pipeline, or

(f) the commodity pipeline, or a portion thereof, sustains a precautionary or emergency shut- down for reasons that relate to or create a hazard to the safe transportation of a commodity;

Serious Injury
An injury that is likely to require admission to a hospital.